APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Rohit Ramani et al.	Examiner: Christine Y. Ng
Serial No.: 10/017,642	Group Art Unit: 2616
Filed: December 14, 2001	Docket: 1488.011US1

For: TECHNIQUE TO IMPROVE THE PERFORMANCE OF TRANSMISSION CONTROL PROTOCOL- TCP IN LOSSY NETWORKS

APPEAL BRIEF UNDER 37 CFR § 41.37

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Appeal Brief is presented in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on December 22, 2006, from the Final Rejection of claims 1-3, 8-10, 12-14, 19-21, 26-29 and 33-36 of the above-identified application, as set forth in the Final Office Action mailed on August 2, 2006.

The Commissioner of Patents and Trademarks is hereby authorized to charge Deposit Account No. 19-0743 in the amount of $500.00 which represents the requisite fee set forth in 37 C.F.R. § 41.20(b)(2). The Appellants respectfully request consideration and reversal of the Examiner's rejections of pending claims.

1. REAL PARTY IN INTEREST

The real party in interest of the above-captioned patent application is the assignee, SASKEN COMMUNICATION TECHNOLOGIES LIMITED.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present appeal.

3. STATUS OF THE CLAIMS

The present application was filed on December 14, 2001 with claims 1-36. A non-final Office Action was mailed February 9, 2006. A Final Office Action was mailed July 24, 2006. Claims 4-7, 11, 15-18, 22-25 and 30-32 were objected to. Claims 1-3, 8-10, 12-14, 19-21, 26-29 and 33-36 stand finally rejected, remain pending, and are the subject matter of the present Appeal.

4. STATUS OF AMENDMENTS

No amendments have been made subsequent to the Final Office Action, dated July 24, 2006.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Some aspects of the present inventive subject matter include, but are not limited to, in one embodiment, as recited in independent claim 1, a method for providing a transport protocol within a lossy network. The method includes receiving multiple packets. (Page 7, lines 7-8; FIG. 3, No. 115; FIG. 5, No. 510). Each of the received packets includes a header and an associated sequence number, and the header includes a congestion alleviation indication and an impending congestion indication. (Page 7, lines 8-17). The network is monitored for congestion caused by the received packets. The header of some of the packets are marked with an impending congestion indication based on the outcome of the monitoring of the network. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). The monitored multiple packets are transmitted through the lossy network. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). Acknowledgements of receipt are returned for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). Each of the received acknowledgements are monitored for the sequence number and the marked impending congestion indication associated with each of the received packets. (Page 9, lines 3-4; FIG. 3, No. 110; FIG. 5, No. 560). A congestion control mechanism is invoked to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and the header is marked with a congestion alleviation indication. (Page 9, lines 4 – 21; FIG. 3, No. 110; FIG. 5, No. 570).

In another embodiment, as recited in independent claim 12, a computer-readable medium (FIG. 6, No. 604) is disclosed that has computer-executable instructions (FIG. 510, Nos. 510-570) for providing a transport protocol within a lossy network. The instructions allow for receiving multiple packets. (Page 7, lines 7-8; FIG. 3, No. 115; FIG. 5, No. 510). Each of the received packets includes a header and an associated sequence number, and the header includes a congestion alleviation indication and an impending congestion indication. (Page 7, lines 8-17). The instructions further allow for monitoring the network for congestion caused by the received packets. The instructions also mark the header of some of the packets with an impending

congestion indication based on the outcome of the monitoring, and transmit the monitored multiple packets through the lossy network. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530; Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). The instructions return acknowledgements of receipt for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). The instructions further monitor each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets. (Page 9, lines 3-4; FIG. 3, No. 110; FIG. 5, No. 560). The instructions also allow for invoking a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and further for marking the header with a congestion alleviation indication. (Page 9, lines 4 – 21; FIG. 3, No. 110; FIG. 5, No. 570).

In another embodiment, as recited in independent claim 19, a computer system provides a transport protocol within a lossy network. (FIGS. 1, 2, and 3). The computer system includes a storage device, an output device, and a processor. (FIG. 5, Nos. 602, 604, 612, 614, and 618). The processor is programmed to repeatedly perform a method. The processor programmed method includes receiving multiple packets. (Page 7, lines 7-8; FIG. 3, No. 115; FIG. 5, No. 510). Each of the received packets includes a header and an associated sequence number, and the header includes a congestion alleviation indication and an impending congestion indication. (Page 7, lines 8-17). The method monitors the network for congestion caused by the received packets, and marks the header of some of the packets with an impending congestion indication based on the outcome of the monitoring. The method further transmits the monitored multiple packets through the lossy network (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530; Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530), and returns acknowledgements of receipt for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). Lastly, the method monitors each of the received acknowledgements for the

sequence number and the marked impending congestion indication associated with each of the received packets (Page 9, lines 3-4; FIG. 3, No. 110; FIG. 5, No. 560), and invokes a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and marks the header further with congestion alleviation indication. (Page 9, lines 4 – 21; FIG. 3, No. 110; FIG. 5, No. 570).

In another embodiment, as recited in independent claim 26, an apparatus provides a transport protocol within a lossy network. (FIGS. 1, 2, and 3). The apparatus includes a sender base station. (FIG. 3, No. 115). The sender base station receives multiple packets from a sender and outputs the packets through a lossy network. (Page 7, lines 7-8; FIG. 3, No. 115; FIG. 5, No. 510). Each of the received packets includes a header and an associated sequence number, and the header includes a congestion alleviation indication and an impending congestion indication. (Page 7, lines 8-17). A communication network includes an analyzer to receive the outputted packets, to monitor the network for congestion caused by the received packets, and to further mark the header of some of the received packets with an impending congestion indication based on an outcome of the monitoring. (FIG. 3, No. 320). A receiver base station includes a transmit module to transmit the packets through the lossy network. (Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530; Page 7, line 18 – Page 8, line 3; FIG. 3, No. 320; FIG. 5, Nos. 520, 530). A receiver receives the transmitted packets and sends acknowledgements back to the sender through the communication network. (Page 7, line 18 – Page 8, line 3; FIG. 3, Nos. 140, 320; FIG. 5, Nos. 520, 530). The acknowledgements include a sequence number associated with each of the received packets, any associated marked impending congestion indication, and the congestion alleviation indication. The sender monitors each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets. (Page 9, lines 3-4; FIG. 3, No. 110; FIG. 5, No. 560). The sender further invokes a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and further marks the header with congestion alleviation indication. (Page 9, lines 4 – 21; FIG. 3, No. 110; FIG. 5, No. 570).

This summary does not provide an exhaustive or exclusive view of the present subject matter, and Appellant refers to the appended claims and their legal equivalents for a complete statement of the invention.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-3, 12-14, 19-21 and 26-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapman, et al. (U.S. Patent No. 6,922,390) in view of Lee, et al. (U.S. Patent No. 6,587,437).

Claims 8 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapman et al. (U.S. Patent No. 6,922,390) in view of Lee et al. (U.S. Patent No. 6,587,437) and in further view of LaGalbo et al. (U.S. Patent No. 6,947,446).

Claims 9, 10 and 34-36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapman et al. (U.S. Patent No. 6,922,390) in view of Lee et al. (U.S. Patent No. 6,587,437) and in further view of Takagi (U.S. Patent No. 6,937,600).

7. ARGUMENT

Claim 1 of the pending application recites a method for a transport protocol within a network. The packets transmitted through the network include a header, and the header includes a congestion alleviation indication. After invoking a congestion control mechanism, the header is marked with a congestion alleviation indication. All of the other independent claims (*i.e.*, claims 1, 12, 19, and 26) recite these same limitations.

U.S. Patent No. 6,922,390 to Chapman et al. ("the '390 patent") relates to a method and apparatus for forecasting and controlling congestion within a data transport network. (Col. 1, lines 9-12). The Office Action of February 9, 2006 admits that the '390 does not disclose a header that includes a congestion alleviation indication. The Office Action of February 9, 2006 further admits that the '390 patent does not mark the header with a congestion alleviation indication after invoking a congestion control mechanism. The Office Action of July 24, 2006 repeats these admissions.

U.S. Patent No. 6,587,437 to Lee et al. ("the '437 patent") discloses that in a binary available bit rate (ABR) flow control, which is a method of binary flow control in a data communications network known to those of skill in the art, a bit is set in each data cell during network congestion. The bit is an indicator of forward congestion and is known as an Explicit Forward Congestion Indicator (EFCI) bit. (Col. 2, lines 25-30). A network element in an impending congested state or a currently congested state may set the EFCI bit in the header so that this indication may be examined by the destination system. (Col. 3, lines 61-64). However, Lee et al. points out that like any typical feedback control system, the delay in feedback impacts the effectiveness of the system, (Col. 4, lines 31-33), and that various techniques have been used in the prior art to minimize feedback delays in the transmission of information regarding the explicit rate of transmission. (Col. 4, lines 24-25). Notwithstanding these various techniques, Lee et al. states that there is a need to accelerate the transmission of the explicit rate information, (Col. 4, lines 64-67), and then discloses a method of feedback control in a communication network that includes a closed loop of network elements for forward and backward messages. (Col. 5, lines 1-12).

As stated above in Section No. 6, the pending claims were rejected under 35 U.S.C. § 103(a) as being unpatentable over a combination of Chapman, et al. (U.S. Patent No. 6,922,390), Lee, et al. (U.S. Patent No. 6,587,437), LaGalbo et al. (U.S. Patent No. 6,947,446), and Takagi (U.S. Patent No. 6,937,600).

The Patent Office bears the initial burden of factually supporting a *prima facie* case of obviousness.[1] In order for the Office Action to establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.[2]

The Patent Office has failed to established a *prima facie* case of obviousness under 35 U.S.C. § 103(a) at least because neither the '390 patent to Chapman et al. nor the '437 patent to Lee et al. discloses a header record containing a congestion alleviation indication, or marking a header with a congestion alleviation indication after invoking a congestion control mechanism.

The Advisory Action of October 18, 2006 states that Lee et al. discloses a congestion control mechanism in which each network element can inform other network elements of congestion by setting the EFCI bit. The Advisory Action further states that if the EFCI bit is set, the system will lower its cell rate to control the congestion, and once the congestion is alleviated, the EFCI bit will be set back to "0" to indicate that the network element is not in a congested state or will not be in a congested state. The Advisory Action then admits that the EFCI bit does not always equate to congestion alleviation (such as when there was not prior congestion), but contends that the EFCI bit does sometimes equate to congestion alleviation (such as when there was prior congestion). The Advisory Action further argues that the claim only requires that after congestion has been alleviated, the header is marked with a congestion alleviation indication. Finally, the Advisory Action contends that Lee et al. discloses that after congestion has been

[1] MPEP 2142.
[2] MPEP § 2142 (citing *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

alleviated, the EFCI bit changes back to "0" since the system does not need to lower its cell rate anymore, and that this reads on the "congestion alleviation indication."

The independent claims, in pertinent part, recite "a congestion alleviation indication" and "marking the header with a congestion alleviation indication." Contrary to the assertions in the Advisory Action, Lee et al. does not disclose a congestion alleviation indication. Consequently, the Patent Office has failed to establish a *prima facie* case of obviousness, and the Applicant respectfully requests the reversal of the rejection of the claims.

The EFCI bit of Lee et al. is an Explicit Forward ***Congestion Indicator***. Somewhat tellingly, the name of the EFCI bit itself only suggests that the bit may be used to ***indicate congestion***. The bit name does not disclose, suggest, teach, or hint that it may ***indicate congestion alleviation.*** More tellingly, the specification of Lee et al. makes no disclosure, suggestion, teaching, or hint of a method, system, or structure to indicate that congestion has been alleviated. This is not at all surprising, since Lee et al. specifically states that its disclosure is related to accelerated feedback of network congestion information (Col. 1, lines 9-10; Col. 4, lines 64-67), and there is simply no teaching in Lee et al. that its disclosure relates in any way to an indication of congestion alleviation. Rather, that teaching is supplied by the Advisory Action, using the teachings of the Applicant's disclosure against the Applicant.

The Advisory Action contends that the EFCI bit of Lee et al. may be set to indicate congestion, and reset when there is no longer congestion, thereby indicating that congestion has been alleviated. One problem with this contention however is that there is absolutely no mention of such a concept in Lee et al. Once again, this concept is disclosed in the present application, and the Patent Office is improperly using the Applicant's own disclosure to reject the Applicant's claims.

Moreover, the Advisory Action concedes that the EFCI bit does not always equate to congestion alleviation. The Applicant respectfully submits that the reason for this is that the EFCI bit is not a congestion alleviation indication as recited in the claims. Lee et al. discloses neither a congestion alleviation indication per se, nor a teaching that its EFCI bit may be used to determine whether congestion has been alleviated. Once again, the leap over the chasm separating Lee et al. from the presently claimed subject matter is executed by the Patent Office,

since there is no teaching, suggestion, or motivation found in Lee et al. or any other prior art of record relating to congestion alleviation indication.

The Advisory Action, in addressing the fact that in Lee et al. the EFCI bit does not always equate to congestion alleviation, states that the claims only require that after congestion has been alleviated, the header is marked with a congestion alleviation indication. The Advisory Action then concludes that Lee et al. similarly discloses that after congestion has been alleviated, the EFCI bit changes back to "0" since the system does not need to lower its cell transmission rate anymore, which reads on the congestion alleviation indication. The Applicant respectfully disagrees.

This conclusion in the Advisory Action clouds the fact that the EFCI bit of Lee et al. provides information only on whether there is congestion (or impending congestion) or not. By stark contrast, the congestion alleviation indication of the present claims indicates whether congestion has been alleviated or not. The presence of congestion (or impending congestion) and the alleviation of congestion are two distinct pieces of information (as further indicated by the presence of an impending congestion indicator ***and a separate*** congestion alleviation indicator in every independent claim). A congestion indicator indicates congestion and does not indicate congestion alleviation, and a congestion alleviation indicator indicates congestion alleviation and does not indicate congestion (or impending congestion).

Consequently, a person of skill in the art, upon examining the EFCI bit, can never tell, without further analysis or information, whether congestion has been alleviated. The Applicant's disclosure has filled this void in the prior art, for in the Applicant's disclosure, the congestion alleviation indication always, without more, indicates whether congestion has been alleviated or not. Lee et al. fails to teach or suggest this congestion alleviation, the logic of the Advisory Actions amounts to invention based upon the Applicant's disclosure, and the Patent Office consequently fails to establish a *prima facie* case of obviousness. The Applicant therefore respectfully requests the reversal of the rejection of the claims.

8. SUMMARY

It is respectfully submitted that the art cited does not render the claims obvious and that the claims are patentable over the cited art. Reversal of the rejection and allowance of the pending claims are respectfully requested.

Respectfully submitted,

ROHIT RAMANI et al.

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Date January 29 2007 By

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 29 day of January 2007.

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Name

Signature

CLAIMS APPENDIX

1. A method for providing a transport protocol within a lossy network, comprising:

receiving multiple packets, wherein each of the received packets includes a header and an associated sequence number, wherein the header includes a congestion alleviation indication and an impending congestion indication;

monitoring the network for congestion caused by the received packets;

marking the header of some of the packets with an impending congestion indication based on the outcome of the monitoring;

transmitting the monitored multiple packets through the lossy network;

returning acknowledgements of receipt for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication;

monitoring each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets; and

invoking a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and further marking the header with a congestion alleviation indication.

2. The method of claim 1, wherein monitoring the network for congestion, comprises:

monitoring the number of packets waiting in line to be transmitted; and

comparing the number of packets waiting in line to a predetermined minimum line size and a predetermined maximum line size.

3. The method of claim 2, wherein marking the header of some of the packets with an impending congestion indication, comprises:

if the number of packets waiting in line is greater than the predetermined minimum line size and less than the predetermined maximum line size, then marking the header of some of the

received packets based on a predetermined probability with an impending congestion indication; and

if the number of packets waiting in line is greater than the predetermined maximum line size, then the packets waiting in line beyond the predetermined maximum line size will be dropped.

8. The method of claim 1, further comprising:

providing a forward error correction to the header of each packet.

9. The method of claim 1, wherein marking the header of some of the multiple packets with an impending congestion indication, comprises:

flagging CE (Congestion Experienced) bits in the header of some of the multiple packets; and

flagging a CWR (Congestion Window Reduced) bit in the header of some of the multiple packets.

10. The method of claim 9, wherein returning acknowledgements comprise:

flagging an ECE (Explicit Congestion Notification Echo) bit in the acknowledgements.

12. A computer-readable medium having computer-executable instructions for providing a transport protocol within a lossy network, comprising:

receiving multiple packets, wherein each of the received packets includes a header and an associated sequence number, wherein the header includes a congestion alleviation indication and an impending congestion indication;

monitoring the network for congestion caused by the received packets;

marking the header of some of the packets with an impending congestion indication based on the outcome of the monitoring;

transmitting the monitored multiple packets through the lossy network;

returning acknowledgements of receipt for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication;

monitoring each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets; and

invoking a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and further marking the header with a congestion alleviation indication.

13. The computer-readable medium of claim 12, wherein monitoring the network for congestion, comprises:

monitoring the number of packets waiting in line to be transmitted; and

comparing the number of packets waiting in line to a predetermined minimum line size and a predetermined maximum line size.

14. The computer-readable medium of claim 13, wherein marking the header of some of the packets with an impending congestion indication, comprises:

if the number of packets waiting in line is greater than the predetermined minimum line size and less than the predetermined maximum line size, then marking the header of some of the received packets based on a predetermined probability with an impending congestion indication; and

if the number of packets waiting in line is greater than the predetermined maximum line size, then the packets waiting in line beyond the predetermined maximum line size will be dropped.

19. A computer system for providing a transport protocol within a lossy network, comprising:

a storage device;

an output device; and

a processor programmed to repeatedly perform a method, comprising:

receiving multiple packets, wherein each of the received packets includes a header and an associated sequence number, wherein the header includes a congestion alleviation indication and an impending congestion indication;

monitoring the network for congestion caused by the received packets;

marking the header of some of the packets with an impending congestion indication based on the outcome of the monitoring;

transmitting the monitored multiple packets through the lossy network;

returning acknowledgements of receipt for each of the transmitted packets, based on the sequence number associated with each of the packets, and any associated marked impending congestion indication and the congestion alleviation indication;

monitoring each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets; and

invoking a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and marking the header further with congestion alleviation indication.

20. The system of claim 19, wherein monitoring the network for congestion, comprises:

monitoring the number of packets waiting in line to be transmitted; and

comparing the number of packets waiting in line to a predetermined minimum line size and a predetermined maximum line size.

21. The system of claim 20, wherein marking the header of some of the packets with an impending congestion indication, comprises:

if the number of packets waiting in line is greater than the predetermined minimum line size and less than the predetermined maximum line size, then marking the header of some of the received packets based on a predetermined probability with an impending congestion indication; and

if the number of packets waiting in line is greater than the predetermined maximum line size, then the packets waiting in line beyond the predetermined maximum line size will be dropped.

26. An apparatus for providing a transport protocol within a lossy network, comprising:

a sender base station to receive multiple packets from a sender and output the packets through a lossy network, wherein each of the received packets includes a header and an associated sequence number, wherein the header includes a congestion alleviation indication and an impending congestion indication;

a communication network including an analyzer to receive the outputted packets and monitor the network for congestion caused by the received packets and to further mark the header of some of the received packets with an impending congestion indication based on an outcome of the monitoring;

a receiver base station including a transmit module to transmit the packets through the lossy network; and

a receiver to receive the transmitted packets and to further send acknowledgements back to the sender through the communication network, wherein the acknowledgements include a sequence number associated with each of the received packets and any associated marked impending congestion indication and the congestion alleviation indication, wherein the sender monitors each of the received acknowledgements for the sequence number and the marked impending congestion indication associated with each of the received packets, and invokes a congestion control mechanism to control a congestion window size which regulates the transmitted packets based on the monitoring of the acknowledgements and the marked impending congestion indication, and further marks the header with congestion alleviation indication.

27. The apparatus of claim 26, wherein the analyzer further monitors a number of packets waiting in a line transmitted by the sender base station.

28. The apparatus of claim 26, wherein the analyzer further comprises a comparator to compare the number of received packets waiting in line with a predetermined minimum line size and a predetermined maximum line size, wherein the analyzer marks the header of some of the received packets with the impending congestion indication, based on the outcome of the comparison.

29. The apparatus of claim 28, wherein the analyzer marks the header of some of the received packets when the number of packets waiting in line is greater than the predetermined minimum line size and less than the predetermined maximum line size based on a predetermined probability with an impending congestion indication; and

if the number of packets waiting in line is greater than the predetermined maximum line size, then the packets waiting in line beyond the predetermined maximum line size will be dropped.

33. The apparatus of claim 26, wherein the sender further provides a forward error correction to the header of each packet.

34. The apparatus of claim 26, wherein the analyzer marking the header comprises flagging CE bits in the header.

35. The apparatus of claim 26, wherein the sender marking the header comprises flagging a CWR bit in the header.

36. The apparatus of claim 26, wherein the receiver marking the acknowledgement comprises flagging an ECE bit in the acknowledgement.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.